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JUBILEE PUBLICATION



MA-HAL



# **FISHERIES AND FISHERIES ADVOCACY IN HUNGARY 2018**

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## PREFACE TO THE JUBILEE PUBLICATION OF MA-HAL

*„Those who do not know the life and work of fishermen may imagine fishing and net dragging as a merry, singing autumn celebration, something like a harvest festival, where there is work, of course, but then pretty girls await the handsome young fishermen with wihe and hot fish soup. Well, it is far from that! (...) But someone who belongs to this beautiful autumn trade will never want anything else, and, having had to leave it, will always long back to the waters as a wild goose in captivity.” (István Fekete: Fishing, 1955.)*

In agreement with the words of István Fekete, the profession of Hungarian fish farmers and fishermen is regarded as one of the hardest jobs in agriculture. Just think about a cold, rainy October or November day when others do not even want to leave the warm room. Even on such days, fishermen still pull the net standing waist-high in the ice-cold water of the harvesting sump in the drained pond in order to supply fish for the Christmas table. And it is no different on a hot summer day, either: fish rearing does not only consist of spring harvesting and fishermen are always beside the waters.

The successful long-term survival of a profession is impossible without a strong and highly professional advocacy organization, wherein Hungarian fisheries organizations has always taken the lead. The Hungarian Aquaculture and Fisheries Inter-branch Organization (MA-HAL) is a worthy successor of the previous organizations (HTSZ, HOSZ, HTT, HALTERMOSZ, MASZ and MAHAL), which efficiently and successfully represents the sectoral interests, continuing the legacy of its predecessors and modernizing it to the necessary extent in order to adapt it to modern challenges. MA-HAL has a very broad range of activities going well beyond the scope of an inter-branch organization, as it is represented in all fields of the sector from fisheries and aquaculture training through fish marketing and promotion of fish consumption to sustainable and innovative fish production.

The publication that you hold in your hand presents this very diverse work lasting already for more than 60 years, containing interesting information for both professionals and the general fish-loving public.

With these thoughts, I wish to all who read this jubilee publication to get a feeling of the beauty of this difficult profession!

Dr. István Nagy  
Minister of Agriculture

## MILESTONES OF THE LAST 60 YEARS OF FISHERIES ADVOCACY

The history of the Hungarian fisheries and aquaculture sector, as well as of representing the sector's interests, goes back to old times. This is well shown by the establishment of the Budapest-based National Fishery Association in 1885. Still, this publication only discusses fisheries advocacy organizations that have been active during the last 60 years. In this overview, we seek to present the answers given by them to the challenges of the time. Below is a list of the changes related to the transformations of these advocacy groups in the period in question:

- February 19, 1957: the Executive Committee of Fisheries Cooperatives is established. The subsequent changes of this institution are well reflected by the modifications of its name.
- 1967: The new name of the organization becomes the Union of Fisheries Cooperatives.
- December 20, 1989: The National Fish Producers' Association is established.
- December 12, 2003: The National Fish Producers' Association merges with the Fisheries Product Board to form the National Association and Product Board of Fish Producers.
- September 8, 2010: as a result of another transformation, the Hungarian Association of Fish Producers and Fishing Water Users is founded.

The above chronology shows the transformations of the advocacy organization founded in 1957.

However, the fisheries and aquaculture sector also established new advocacy groups during the 60 years:

- September 25, 1992: the Fisheries Product Board is established;
- May 31, 2010: the Hungarian Aquaculture Association is founded;
- December 16, 2016: the Hungarian Aquaculture and Fisheries Inter-branch Organization is formed





The representation of economic and professional interests and human resource management have been the main areas of fisheries and aquaculture advocacy. It has always been a principal task for the advocacy organization to explore the problems of the time and try to find adequate solutions to them. We will present some important examples from the history of the last 60 years along these lines.

The advocacy organization established after WWII, in 1957, was founded by cooperatives involved in fisheries management on natural waters. Providing legal certainty for their economic activities was considered their main task. This was assisted by Decree XV of 1961, which consolidated all legal matters related to fisheries in natural waters and artificial fish ponds into a single legislative act, as well as prolonged the expired fisheries rights agreements to 20 years. This decree created legal certainty for organizations managing natural waters (fisheries cooperatives). This was the period when the practices of inducing fish spawning with pituitary extract and removing egg stickiness (Woynárovich method) became generally used in the sector. The Executive Committee of Fisheries Cooperatives recognized the epochal significance of this fact and adopted a resolution establishing a new organizational unit that would make use of the advantages of the modern, innovative method and, at the same time, serve the needs of the member organizations. This is how the Dinnyés Fish Farm was founded in 1961, one of its tasks being to meet the demand of the member organizations for fish seed. This centralized system of seed supply was ahead of its time and later became a model for the establishment of a similar centralized seed supply unit by state farms involved in fisheries, i.e. the construction of the Warmwater Fish Farm (TEHAG) in Százhalombatta, whose tasks, in addition to seed supply, also included the international dissemination of advanced Hungarian fish propagation methods, as well as training. In 1967, the Dinnyés Fish Farm was the first in Europe to successfully reproduce herbivorous fishes (grass carp, silver carp), which were introduced around that time.

In order to assist the representing of professional interests, the Union established several professional committees, which, in addition to assisting farming activities, became platforms for professional and



further training. The basic principle of human resource policy was to employ well-qualified, adequately remunerated fishermen taking into account societal requirements as well. These objectives were to be attained through adequate training and further training. However, it should be noted that, at the time of the establishment of the advocacy organization, there were still fishing dynasties working in the sector, where the know-how was passing from father to son. Because of the specific profession, the balance of practical skills and theoretical knowledge is very important. This method allowed prospective fishermen to get acquainted with the waters, the habits of fish, the manufacturing of fishing gear and the methods of fishing. Unfortunately, this tradition had changed by 1980–1985, and therefore, the advocacy organization had to take upon itself the organization and the creation of opportunities for adult training, which was done in the form of winter residential courses. Since 1963, this work has been assisted by the Sándor Jávorka Vocational School in Tata, where special youth and adult courses have been organized in addition to vocational training.

**The organizational development of the fisheries and aquaculture advocacy during the last 60 years can be summarized as follows:**

### From 1972 to 2010

- The management of the Union allowed the joining of agricultural cooperatives with a fisheries/aquaculture component from 1972, thus expanding its activities to the representation of the interests of pond farms as well;
- In 1989, the Association changed its statutes to allow any business organization or physical person involved in fisheries and aquaculture on the territory of Hungary to become a member of the advocacy organization;

- Privatization was the main issue in 1990–1992. The biggest changes necessarily occurred after the political changes in the country. The advocacy organization defined its main tasks as follows: „The specific means of advocacy should support professional investors.”
- In 1992, with the establishment of the Fisheries Product Board, the advocacy organization got into a position to regulate markets as well;
- In 1995, carp breeding organizations were established with the assistance of the Association in order to facilitate the qualification of Hungarian common carp breeds.
- In February 2000, the first issue of Halászati Lapok appeared aiming to provide better information for the members;
- In 2004, about 15–20 per cent of fish sales were realized through supermarket chains. The Association established 5 committees in order to improve advocacy work.

### From 2010 to now

- On May 31, 2010, 11 business organizations and 3 research and educational institutions founded the Szarvas-based Hungarian Aquaculture Association (MASZ), which mostly aimed at strengthening sectoral innovation. To attain this objective, it organized professional events, published professional materials and participated in domestic and international aquaculture development projects in addition to representing the members' interests.
- The election of MAHAL officers on September 8, 2010, did not only lead to taking up a new name (Hungarian Association of Fish Producers and Fishing Water Users), but also to the election of a new management and adopting of a new strategy. The main points of the new programme were the following: (1) Better focus on the representation of natural water fisheries; (2) Relaunching the support



- for the Environmental Management Programme; (3) Strengthening sectoral marketing activities;
- (4) Making profit in order to cover the own contribution when applying for development funds; (5) The representation of the fisheries and aquaculture sector's interests does not exclude support to the recreational and angling sector, to which, a continued supply of stocking material should be provided.
- The first joint meeting of the boards of the two fisheries advocacy organizations, MAHAL and MASZ, took place in October of the same year.
- Taking into account the changes in Hungarian and EU legislation, the increasing demand for market regulation, as well as other economic, social and external factors, the idea of merging the two advocacy organizations emerged. Personal changes took place in the MAHAL management. The Dinnyés Pond Farm Ltd. was established.
- In 2014, a new executive director was elected by MAHAL and the association moved to a new headquarters. The status of fish ponds changed under the new Land Property Act. The system of divisions joining the members with common interest was renewed. A cooperation agreement was concluded between the National Chamber of Agriculture and MAHAL.
- In 2015, a strategic partnership agreement was signed by the minister of agriculture and the president of MAHAL. The advocacy organization initiated negotiations on decreasing the VAT of fish. When reelecting the officers, the General Assembly set the priority tasks of establishing an inter-branch organization and strengthening external relations.
- The Hungarian Aquaculture and Fisheries Inter-branch Organization (MA-HAL) was established on December 16, 2016, and registered by the Budapest Capital Regional Court on June 12, 2017. The available legal possibilities create new opportunities for representing the sector's interests. The Ministry of Agriculture, with its resolution of April 5, 2018 (ref. no. ApF/154 – 1/2018), recognized the Hungarian Aquaculture and Fisheries Inter-branch Organization as the inter-branch organization of the fisheries and aquaculture sector.

# MAIN DATA OF HUNGARIAN AQUACULTURE

Currently, the Hungarian aquaculture sector includes fish production in pond farms and intensive systems, as well as fish processing. In economic terms, when evaluating the role of the sector in the national economy, one of the main indices is its contribution to the output and the GDP. Hungarian fisheries and aquaculture represent a relatively small part of the agricultural sector. The value of food fish production was 7.96 billion HUF/year (EUR 25.5 million) in 2015, which means that the sector (i.e. food fish production) contributed only 0.003 percent to the national economy's GDP.

In comparison with the value of the commodities produced by Hungarian animal husbandry sectors, the contribution of food fish production is already 1.5 percent. When comparing the gross production value of the fisheries and aquaculture sector to that of other Hungarian animal husbandry sectors, this share becomes even slightly higher, 1.67 percent in 2016. The significance of the sector goes well beyond the statistical numbers, as pond aquaculture involves a number of economically and socially important aspects that cannot be directly expressed in production terms. These include, in particular, ecosystem services whose specific share is the highest of all agricultural sectors of Hungary here.

Fish ponds are the dominant production facilities of Hungarian aquaculture, with an average operating fishpond area of 24,161 ha between 2004 and 2015. The average food fish production was 15,100 tonnes in the same period. The year-to-year fluctuations of pond fish production mainly depend on weather conditions. Natural water catches (which, since 1 January 2016, mainly consist of recreational catches) also contribute to the national fish supply.

Between 2004 and 2015, the natural water surface exploited for fisheries purposes ranged between approximately 140,113 and 146,148 hectares, respectively, yielding an average fish catch of 7,250 tonnes per year.

Figure 1 shows that 64 percent and 36 percent of the total food fish production of the year 2015 came, respectively, from pond farms and from natural waters and reservoirs as anglers' catch.

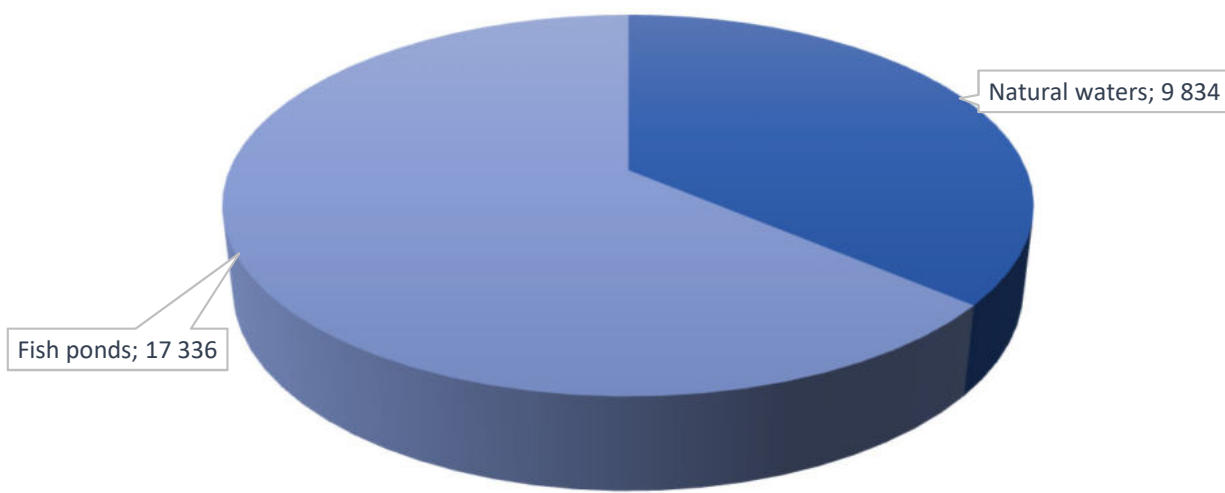


Figure 1. Total food fish production (tonnes)



In addition to pond fish production, intensive aquaculture based on the exploitation of geothermal resources plays an increasing role in Hungarian aquaculture. However, pond fish farming still keeps its dominant position providing 82.4 percent of the total aquaculture production in 2015. The total (extensive and intensive) food fish production volume was 17,336 tonnes in the same year.

It is a characteristic feature of pond fish farming is that it is a typical production method in some regions of the country while it can be virtually absent from others. About 80 percent of pond fish production has long been provided by the same three regions: the Northern Hungarian Plain, Southern Transdanubia and the Southern Hungarian Plain. Common carp constitutes the bulk of the total (gross) fish production of Hungary with nearly 15,000 tonnes. In terms of the production volumes of classic extensive polyculture pond systems, common carp is followed by silver varp, bighead carp and their hybrids (about 2.500 tonnes), grass carp (839 tonnes) and wels (224 tonnes).

Figure 2 shows the share of different species and the main groups of fishes in pond fish production. Intensive aquaculture facilities yielded 17.6 percent of fish production in 2015, whereof the highest volume came from African catfish (about 3.300 tonnes) followed by sturgeons (279 tonnes) and trout (61 tonnes). Figure 3 shows the share of the main species and groups of fishes in intensive fish production.

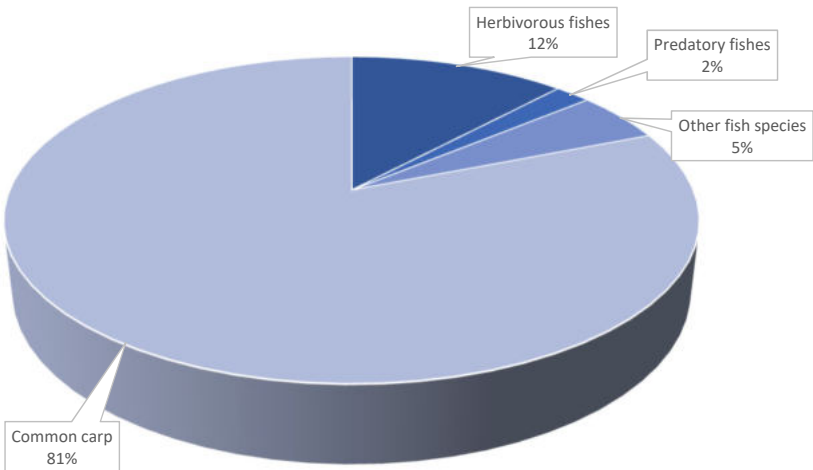


Figure 2. Breakdown of food fish production by species (2015)

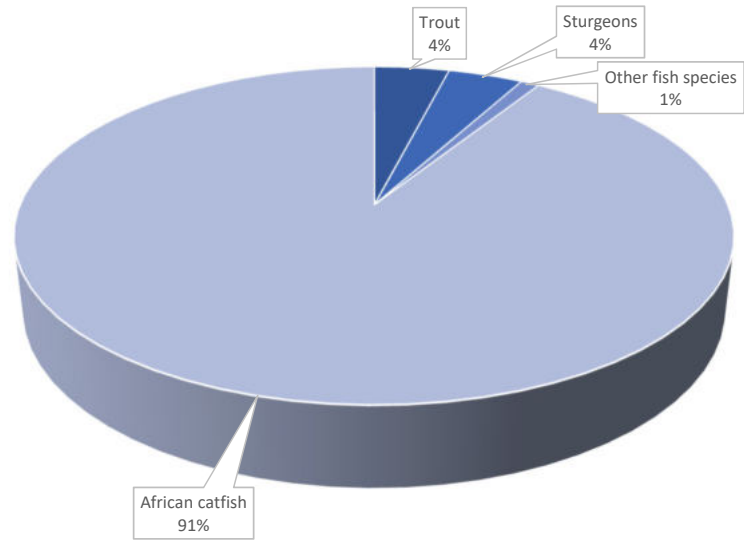


Figure 3. Breakdown of intensive fish production by main species and species groups (2015)

The export value of aquaculture products (including re-export) was close to 8.4 billion HUF (EUR 27 million) in 2016, while their import value, to 30 billion HUF (EUR 96.3 million). The most important category of exported products is live fish, being the only category of aquaculture products whose external trade balance has been positive each year. The export of live fish amounted to 1,000 to 2,000 tonnes before 2010, while it exceeded 7,000 tonnes in 2016. The import of live fish is less significant, its volume was only 1,600 tonnes in 2016. From year to year, the positive balance of the external trade in live fish is mainly ensured by the export of common carp and other live fish (silver carp, bighead carp, wels).

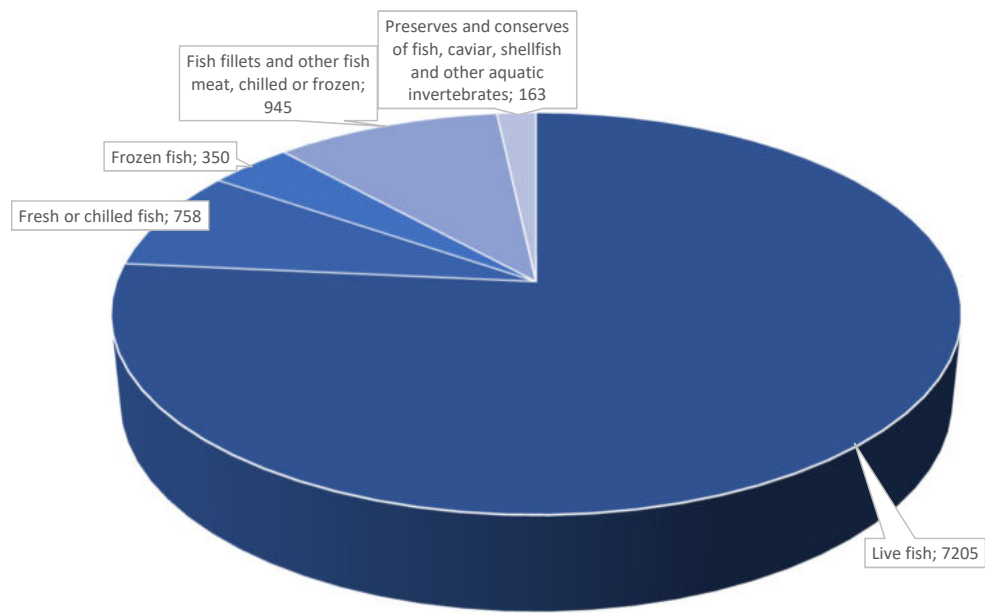


Figure 4. Exports of the main fish product groups from Hungary in 2016

The import of fresh/chilled fish exceeded 1,500 tonnes in 2016, while their export was only 760 tonnes. Fresh/chilled/frozen fish fillets have yielded about one quarter (7.5 billion HUF, i.e. EUR 24.1 million) of the import value of fisheries and aquaculture products for years. The imported volume has ranged between 5,000 and 6,000 tonnes for years, while the export was responsible for one-fifth of the export value (1.7 billion HUF, i.e. EUR 5.5 million) between 2015 and 2016. Ready-made and conserved fish, caviar, shellfish and other aquatic invertebrates covered 42 percent of the import value of fisheries and aquaculture products (12.6 billion HUF, i.e. EUR 40.5 million) in 2016.

Hungarian fish supply has become more balanced in the last 15 years. Supermarket chains, which offer fish and fish products all year round and play an ever-increasing role in fish trade, have significantly contributed to this process. However, about 30 percent of the produced food fish is still sold in the Christmas period. Fish production facilities play an important part in the economy of some rural regions and the employment of the rural population, especially taking into account the increasing importance of aquaculture in the provision of services. Pond aquaculture and intensive aquaculture units employed 2,092 persons in 2016, whereof the number of fishers employed full-time and part-time was 1,452 and 640, respectively. Casual employment in aquaculture amounted to nearly 22,000 working days.





## MAIN FUNCTIONS OF AQUACULTURE

Marine and freshwater fishing is an ancient occupation with a history as long as that of humankind. However, it went through a significant development in the last centuries and has reached the limits of sustainability by now. In parallel, fish production (first in ponds, then in intensive systems) has also developed. In addition to fish breeding, the production of other aquatic organisms (plants, vertebrates and invertebrates) in controlled production systems, as well as their marketing is also widespread. The generic name for these activities is aquaculture, which can be freshwater or marine. Accordingly, aquaculture includes both pond fish farming, which is of special importance to Hungary, and the quickly developing intensive fish production. However, it is important to stress that aquaculture, in addition to its productive function, has also other functions of societal importance. These functions are briefly summarized below.

**Production:** market- and profit-oriented, purposeful fish production activity performed in aquaculture systems (pond-based or intensive fish production facilities). The produced species are determined by the environmental (infrastructural) conditions, while the produced size, by the market demand and the production possibilities (i.e. partial- or full-cycle pond farms).

Nature conservation and environmental protection: aquaculture systems (in particular, pond fish farming) affect their environment both directly and indirectly. Aquaculture systems create a special microclimate, which positively affects the composition of the flora and fauna in their surroundings. Aquaculture systems have a special role in maintaining the vertebrate fauna of their environment through fish as prey animal. In addition, fish ponds play an important part in improving the quality of underground water resources.



Water management: aquaculture systems play an important role in the water resource management of Hungary, as fish ponds store significant quantities of water, which is used for economic fish production. If necessary, they contribute to meeting the demand for irrigation water and its replenishment. The water control facilities of the production infrastructure also perform multiple functions (e.g. they can be used for carrying floodwaters during river floods).

Economic effects: fish produced in aquaculture systems is the basis for several additional economic activities. Domestically produced freshwater fish is the raw material of the processing sector, i.e. production units specialized specifically to fish production. Besides, aquaculture infrastructure also contributes to the development of such industry segments as energy production or the textile industry.

Societal effects: the health effects of the products originating from aquaculture systems are well-known. A society with more healthy food habits (consuming more fish) puts less burden on the public health system of the country. Fish stocking for recreational purposes contributes to meaningful leisure and recreation (angling). The positive impact of aquaculture on rural employment and rural livelihoods is also important. Impacts on the landscape, as well as the preservation of the traditions and values of rural culture cannot be neglected, either.







### Pond aquaculture

There are many similarities between the pond aquaculture of Hungary and Eastern European countries. We have learned pond aquaculture from each other, both in the past and in the present. Of course, there were occasions when one of the countries took the lead in one area, but then it learned from others in other fields. In the beginning, Hungarians learned pond aquaculture from Germany and Bohemia. On the other hand, they (as well as the others, all the world) learned the technology of large-scale carp propagation from Hungary.

The sixties brought about a new big change, the emergence of polyculture, learnt partly directly from China, partly from Soviet fish farmers. This technology was improved, researched and developed by both us and other COMECON countries. The technologies applied in Hungarian pond aquaculture are mostly still based on traditional methods. A couple of decades ago, the biological optimum and the market optimum of polyculture stocking were close to each other. Today, these values grew radically apart because of the drastic decrease of the prices of silver carp and bighead carp. These species are now mainly produced in ponds because of their positive impact on water quality.

The production volume of pond aquaculture is about the same as a quarter of a century ago. Could we produce more carp? Probably yes. However, market is the real limiting factor. We must understand that our Western European export of live common carp cannot be increased. Luckily, Poland and Romania are still a good uptake market for Hungarian common carp.

On the other hand, it is very positive that progress has been made in the production of predatory fishes. „The harvested volume of predatory fishes (pike, wels, zander) produced in pond farms increased by 55.8 percent in 2016 (from 362.3 tonnes to 565 tonnes) compared to the previous year. The harvested volume of pike, zander and wels increased by 165 percent, 43.1 percent and 28.2 percent, respectively.

In addition to favourable market trends, the growing production is also due to research on the rearing of predatory fishes. Hopefully, Hungarian production technologies of freshwater predatory fishes and selectively bred breeds will help our sector to become a regional leader in the production of these species in the near future.

The Hungarian pond aquaculture has a characteristic feature that strongly differs from the pond farming practice of the surrounding countries. This is the large number of common carp landraces. The Czech Republic, Germany, Romania, as well as Russia and many Asian countries also have had their own breeds, but no other country has as many State-approved breeds (nearly 30) as Hungary. The extent to which these breeds differ from each other in their productive characteristics must be determined by objective and scientifically based breed certification tests in the same way as, for example, it is done with wheat breeds. Excellent breeds are sought for in the world. It can be mentioned as an example that, when common carp seed was exported from Hungary to faraway countries (Iran, Mexico, Uzbekistan, Viet Nam), the receiving countries were quite satisfied with its quality. Hungary has been a „superpower” in the world’s common carp farming for decades and it is important for us to keep this position.

The energy- and water-efficient pond aquaculture developed as an answer to climate change, among others, plays an important role in preserving our environmental and natural values and is expected to become even more important in the future.

Like past and present, pond aquaculture will also have a future!

### **Intensive fish production**

The growth rate of the aquaculture sector is 6.6 percent globally, while in Europe, it has stagnated for the last ten years. On the market of aquaculture products, EU is a net importer: nearly 60 percent of the fisheries products consumed in the EU are produced outside of the EU member states. Despite these facts, there is a clear demand: products of the aquaculture sector currently represent 25 percent of the European finfish and shellfish consumption, which is expected to grow in the future. One of the possibilities of decreasing the import dependence is to increase the volume of intensive fish production.

The roots of intensive fish production (in other words, precision or industrial fish farming) go back to the end of the 19th century. At that time, it was tried to develop the rearing of rainbow trout into a controllable technology by the United States and Germany. Thereafter, in the 1930s, experiments were conducted with marine species (e.g. yellowtail amberjack) in Japan, but these trials were unsuccessful. Intensive fish production started to develop after WWII. It is characterized by the rearing of fish of different species and age groups to the size demanded by the market in fish rearing units of different size and depth (e.g. tubs, tanks, cages) under partly or fully controlled conditions. The initial trials had little success as the technology had several defects. The development of intensive fish farming was strongly supported by two factors:

- 1) Market demand, which required market raw material of stable meat quality produced in controlled conditions.
- 2) Availability of technical-technological elements rendering the already existing systems suitable for intensive fish rearing. This included, among others, feed development, treatment of fish diseases and stress factors, as well as the rapid technological development of fish rearing units.





Intensive fish production systems have the following general characteristics:

- small space requirement,
- artificial feeding,
- large stocking and keeping density,
- controlled character of all production steps.

Intensive fish production systems can be divided into the following categories based on their production volume:

- semi-intensive fish production systems (a transition between pond aquaculture and real intensive systems), where the maximum yield is 1-20 kg fish per cubic meter,
- intensive fish production systems, where a maximum of 20-100 kg fish can be kept in one cubic meter of water,
- super-intensive fish production systems, where the volume of produced fish exceeds 100 kg per cubic meter.

The most popular solutions of intensive fish production systems are currently the following:

- recirculating (water recycling) systems (known in professional literature as RAS, which is an abbreviation of „Recirculating Aquaculture Systems”),
- flow-through systems,
- cage aquaculture systems.

The knowledge of the advantages and disadvantages of intensive fish production is necessary for its evaluation.

The advantages are:

- less water use per unit of produced fish, which is an advantage of RAS compared to flow-through systems,
- smaller space requirement, which is a significant advantage compared to fish ponds,
- continuous control of water quality (temperature, oxygen saturation etc.) and smaller harvesting cost, which is an advantage compared to pond aquaculture.

### **Innovative fish production technologies**

The three fundamental elements of innovation indispensable for increasing the competitiveness of Hungarian aquaculture are available, as there are innovative entrepreneurs, there are R&D results, and financing is also possible through both the Hungarian Fisheries Operational Programme and Hungarian project opportunities. Hungarian aquaculture has a good record of developing new fish production systems and technologies in both pond aquaculture and intensive fish production in tanks.

It is a big challenge of pond aquaculture how fish ponds, as valuable wetlands, can be preserved in a way that would still contribute to increasing the production and employment. The solution is to combine the operation of a fish pond and an intensive fish production unit (small pond, tank, cage), i.e. use a Combined Intensive-Extensive (CIE) system. Jászakiséri Halas Ltd. economically operates a „pond-in-pond” system in farm conditions. High-value species (e.g. hybrid striped bass) are reared in the intensive unit (floating tank), while traditional pond polyculture is applied in the extensive fish pond treating the effluent. Another example of applying a CIE system in farm conditions is the „cage-in-pond” system in operation at the Rétimajor site of Aranypony Ltd., where the intensive rearing of wels is combined with the production of pond aquaculture species including paddlefish. The efficiency of the system’s operation is supported by such innovative practices as the use of solar energy and the application of microorganisms assisting the decomposition of bottom sediments. Another type of CIE systems consists in linking small,

intensively used ponds and large extensive ponds („pond recirculation”), which ensures water and nutrient recycling, and thus, water-efficiency and a more complete nutrient utilization.

Hungarian results in the field of multifunctional pond farming, a specific innovative practice in pond aquaculture mostly associated with the activity of Aranypony Ltd, are exemplary even at a European level. In addition to ecological pond fish farming, the Rétimajor site of the company provides ecosystem and tourist services (e.g. angling), but there is also a purposefully developed system of facilities available for visitors including, inter alia, a pension, a restaurant, a wellness centre, a summer camp and a museum. The activity of ÖKO 2000 Ltd. of Akasztó in the field of the development of multifunctional pond aquaculture is also worth mentioning. Extensive fish ponds and constructed wetlands can also be well used for the treatment of the effluents of intensive fish farms, during which, the „waste” nutrients available in the water can be reused for the rearing of different aquatic organisms (e.g. fish, shellfish, aquatic plants), whereby the load on natural environment can be minimized. This innovative effluent treatment method assists the sustainable development of intensive fish production and contains several innovative elements in itself. The abundantly available and relatively cheaply exploitable thermal sources of Hungary offer good possibilities of intensive warmwater fish rearing and introduction of tropical species into production.

However, the efficient and environmentally friendly use of geothermal water requires innovative solutions. A good example is the African catfish rearing site of Szarvas-Fish Ltd. in Tuka, where the complex system and the applied technology contain several innovative elements including effluent treatment in fish ponds and a constructed wetland. This system is also a good example of freshwater Integrated Multitrophic Aquaculture (IMTA), whose wider application is promoted by EU and other international programmes. The innovative work of Hoitsy & Rieger Ltd. aiming at improving the sustainability of coldwater aquaculture, in particular, trout aquaculture, also deserves attention. This involves partial recycling and treatment of the tanks’ water, as well as the treatment of the effluents in a wetland. There



is unexplored potential in the exploitation of gravel and clay pits left after mining. The water quality of these water bodies is variable, although good production results can be reached through a rational production technology and the use of innovative methods. A good example of this is the activity of Halinno Ltd., which can rear and store 1000 tonnes of fish using cages located in the ponds of a gravel mine of Szigetszentmiklós.

The basic infrastructure of seed production is the hatchery. The renewal of the hatcheries' technical-technological solutions was pushed into the background in the last decades. Recognizing the possibilities offered by the new techniques, Szabolcsi Halászati Ltd. has developed a hatchery meeting the requirements of the modern age: a) the energy demand was optimized by using renewable energy (water and air cooling/heating); b) the manpower need was rationalized and relieved through the introduction of new technologies (e.g. flow meters) and techniques (e.g. installation of equipment taking into account ergonomic aspects).

The Hungarian efforts aiming at innovation in freshwater aquaculture are in line with the EU's programme of developing the Blue Economy, and this work is internationally recognized. Still, the continuation and expansion of innovative work and the promotion of a wide-range application of its results is of fundamental importance.



## AQUACULTURE AND FRESHWATER FISHERIES MANAGEMENT

The natural water fisheries of Hungary were based on the duality of fishing and angling exploitation for decades, with these two modes coexisting in many areas. The fish volumes removed by these forms of exploitation were typically only compensated through regular stocking, as prescribed in the fisheries management plan of the given fisheries area. This was mostly limited to common carp, the most popular fish species in Hungary, and high-value predatory fishes, whose stocks can be efficiently enhanced by stocking. The provisions of the new sectoral law, which came into effect on 1 September 2013, have put the regulation of fisheries on a new basis. The protection and enhancement of the fish stocks capable of renewal and their habitats have come into focus, thus ensuring sustainable exploitation for angling purposes. This approach has assigned a higher value to indigenous fish species and, in particular, the naturally recruited stocks of the waters with adequate spawning areas, which need not – and often cannot – be maintained through stocking. Angling, affecting broad societal groups as a recreational activity, has become a priority in this management system, while commercial fishing decreased and was abolished entirely in natural waters in 2016. Selective fishing for ecological purposes (involving mostly the removal of alien invasive species) is still allowed in Hungary's natural waters, while fisheries traditions are kept and preserved through recreational fishing (with small fishing gear) and the so-called „demonstration fishing” introduced in 2017.

The shift in natural water fisheries is also shown by the fact that, while angling organizations managed only 18 to 23 percent of the registered fishing waters (25,000 to 33,000 ha) before 2015, the expiry of the previous leasing agreements in late 2015 and their re-conclusion under the terms of the new sec-

toral law resulted in almost all natural waters getting into angling management by now. The number of registered fishing areas was 2253 in 2015, with a total area of 144,214 ha.

In 2013, 66 percent of the natural water catches came from angling, i.e. commercial fishing still provided one-third of the total catch. In 2014, the share of the angling catch in the total landed volume was already 93.8 percent, while today, it has reached 98.96 percent. Commercial fishing and selective fishing for ecological purposes yielded only 0.68 percent of the total catch in 2015, while the share of recreational fishing was only 0.36 percent.

This shift is also shown by the increase in the number of anglers: the previous number of around 360,000 registered anglers has exceeded 400,000 in 2016, which was mostly due to the introduction of the so-called „tourist angling tickets”. In general, we can say that angling has now become the dominant exploitation form of natural water fisheries, while fishing complements it as a selective, stock regulation and demonstration activity. The role of traditional small-gear fishing in the enrichment of the range of fishing methods is rather symbolic.

Natural water fisheries and aquaculture both play an important role in the fish supply of Hungarian population. About 40 percent of the consumed domestically produced fish come from natural waters, while the remaining 60 percent, from aquaculture.

It is an important link between aquaculture and natural-water fisheries management is that most fish for the stocking of natural water bodies originate from pond-reared fish stocks. Important aspects of this work are the maintenance of biodiversity through rational stocking of native species (e.g. breams, perch, crucian carp, sterlet) and the suppression of invasive species with native predatory fishes (e.g. pike, zander, wels, asp).

Natural water fisheries management and aquaculture are also linked by the research on fish and the aquatic environment, as well as programmes aiming at preserving fisheries culture and traditions and increasing fish consumption.



The cooperation agreement signed in 2017 by the Hungarian Aquaculture and Fisheries Inter-branch Organization (MA-HAL) and the National Federation of Hungarian Anglers (MOHOSZ) serves well the strengthening of links between fish producers and natural-water anglers.







## HISTORY AND ACTUALITIES OF FISHERIES MARKETING

Hungary used to be a major power in fish consumption in the Middle Ages, when there was already real fisheries management in the country. Today, the per capita fish consumption is very low compared to the European average. It was 6.3 kg/year in 2015, while the European average was 25.5 kg and the world average, around 20 kg. Fisheries marketing already existed in the 1930s, when posters saying „Tell me, cow, why are you so sad? – The good carp meat is here again!” were especially popular. The 1949 slogan „Eat fish, it’s the best dish!” can be considered a classic commercial, commissioned by the Service of Advertisement Organization of the State Advertising Joint Enterprise.

Starting with the establishment of the Executive Committee of Fisheries Cooperatives in 1956, the National Fish Producers’ Association (HOSZ) played an important part in supporting fisheries marketing work. It has regularly taken part in the events of the National Agriculture and Food Exhibition and Fair (OMÉK) since the 1960s, which has been an important step forward in fish marketing. The rapidly changing economic and political environment of the early 1990s and the legislation in force made it necessary for the fisheries and aquaculture sector to create a product board similarly to other agricultural sectors. In 1992, HOSZ established the Fisheries Product Board, which was a sectoral organization responsible for interest representation, interest reconciliation and integration. A separate priority task of the Product Board was to promote fish consumption through community marketing means. The 1998 annual report of the Association contains specifically formulated marketing objectives, which could even be the main pillars of a marketing strategy. In 1999, the Product Board established a Marketing Committee with the priority task of increasing fish (in particular, carp) consumption. An important professional



event also took place in the same year: the International Conference on Fisheries Ecology and Marketing was held in Debrecen with support from the Agricultural Marketing Centre (AMC). Ever since, AMC has regularly supported fisheries marketing programmes.

Since the turn of the millennium, the popularization of fish consumption is also assisted by various events. In parallel with the Association, producers also performed marketing activities on their own, and some of them (e.g. Aranyponty Co.) reached outstanding results in the promotion of fish consumption even independently from the Association's operation. In 2014, the Szeged Fish Soup, made from fillets of Szeged mirror carp produced by Szegedfish Ltd. was included into the Collection of Hungarian Values. In 2016, the common carp produced by the Akasztó Fish Farm (Akasztó Saline Carp) obtained the Gold Ribbon Certificate awarded by the Hungarian Gastronomy Association.

Fish products are also promoted at many gastronomic events. MAHAL organized its National Fish Cooking Contest for the 43rd time in the jubilee year of 2017. The Government already started a community fish marketing programme called „Kapj rá!” („Get hooked!”) in the period of the Fisheries Operational Programme of 2007-2013. The work started with a large-scale market study, which gave a good picture of the relation of Hungarian people to fish, explored the problems and showed the way to possible communication strategies. Fish consumption is also supported by the Ministry of Agriculture every year throughout the year, and especially in the Christmas period.

Really significant results can only be reached in close cooperation of several areas. Proven marketing tools are applied in vain if the product quality is unstable or if the good-quality product reaches the consumer in an inadequate form. Companies can affect the consumers with the quality of their products or by manufacturing products that meet the market demand. Retail units could promote Hungarian fish consumption by preserving the quality and applying methods promoting local sales, as well as establishing new retail units ensuring fish supply to regions where processed fish is currently unavailable or hardly

available. The principal role of the governance is to support efficient marketing tools. The health effects of fish are long known, the risk of cardiovascular diseases could be considerably reduced by increasing fish consumption, which would result in significant savings in health expenses.

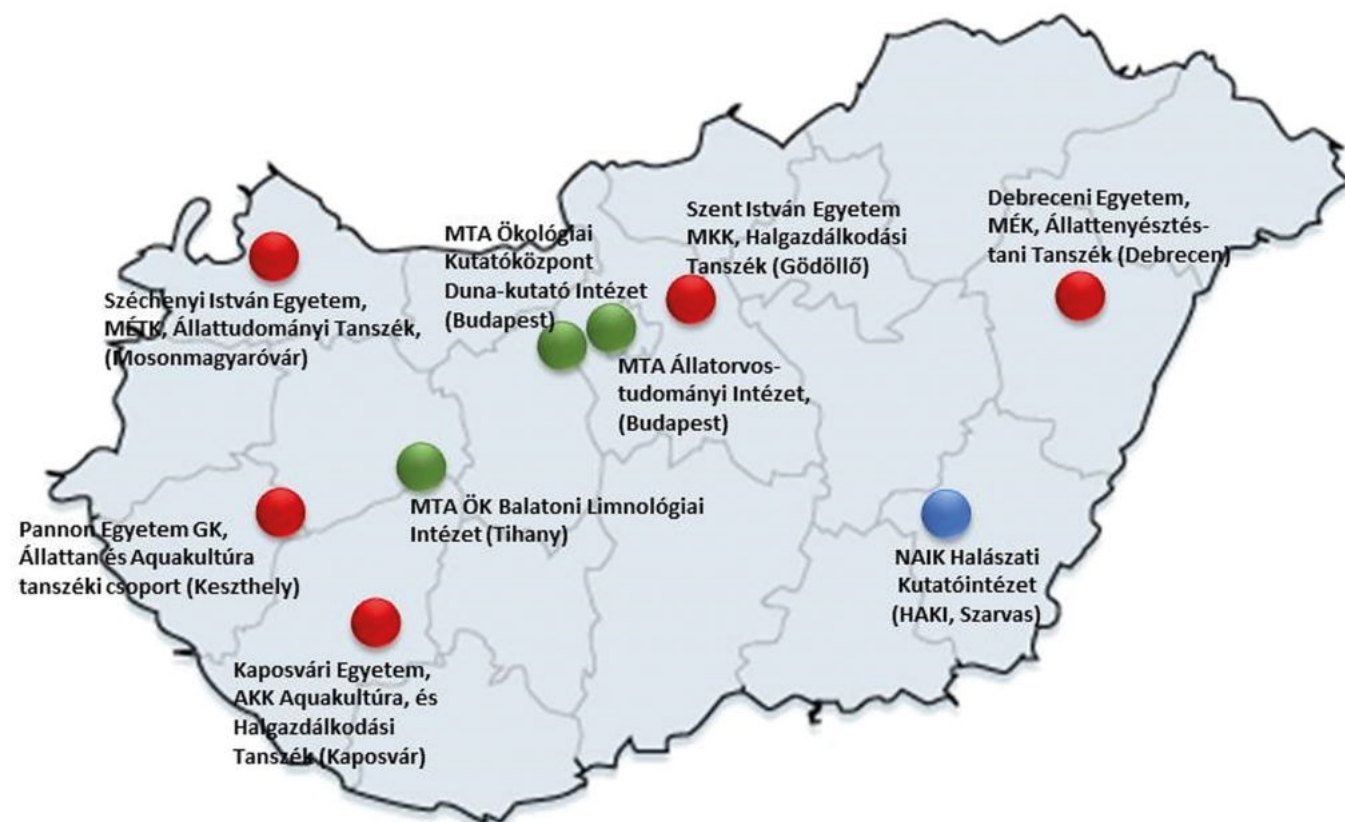


## RESEARCH AND DEVELOPMENT ACTIVITIES OF THE SECTOR

Institutional fisheries research in Hungary dates back to 1906 when a royal decree established the Hungarian Royal Research Station for Fish Physiology and Wastewater Treatment in Budapest, which can be regarded as a legal predecessor of the Research Institute for Fisheries and Aquaculture (HAKI). HAKI, as one of the institutes of the National Agricultural Research and Innovation Centre (NAIK), is still a flagship of Hungarian fisheries and aquaculture research, but there are also many other research centres serving the development and better competitiveness of the fisheries and aquaculture sector. These research centres belong to the Ministry of Agriculture, universities or the Hungarian Academy of Sciences (MTA), but fisheries research activities are also performed by other institutions, private enterprises and National Park Directorates. The main research centres in the field of fisheries and aquaculture are shown in the figure below.

The main Hungarian research centres in fisheries and aquaculture are the following:

- Research Institute for Fisheries and Aquaculture, National Agricultural Research and Innovation Centre (NAIK HAKI, Szarvas)
- Department of Aquaculture, Institute of Aquaculture and Environmental Safety, Faculty of Agricultural and Environmental Sciences, Szent István University (Gödöllő)
- Department of Animal Husbandry, Institute of Animal Sciences, Biotechnology and Nature Conservation, Faculty of Agricultural and Food Sciences and Environmental Management, University of Debrecen (Debrecen)





- Departmental Group of Zoology and Aquaculture within the Department of Animal Sciences, Georgikon Faculty, University of Pannonia (Keszthely)
- Department of Aquaculture and Fisheries, Institute of Environmental Sciences and Nature Conservation, Faculty of Agricultural and Environmental Sciences, University of Kaposvár (Kaposvár)
- Department of Animal Sciences, Faculty of Agriculture and Food Sciences, Széchenyi István University (Mosonmagyaróvár)
- Institute of Veterinary Medical Research, Centre for Agricultural Research, Hungarian Academy of Sciences (MTA ATK ÁOTI, Budapest)
- Balaton Limnological Institute, Centre for Ecological Research, Hungarian Academy of Sciences (MTA ÖK BLI, Tihany)
- Danube Research Institute, Centre for Ecological Research, Hungarian Academy of Sciences (MTA ÖK DKI, Budapest-Debrecen)

The programme of fisheries and aquaculture research in Hungary is in agreement with the objectives of the national fisheries and aquaculture strategy and assists their realization. Priority research and development objectives include the responsible exploitation and protection of our aquatic resources, improving healthy nutrition and increasing fish consumption. The results in the fields of the breeding of common carp, the utilization of thermal waters in aquaculture, the development of new pond aquaculture technologies, the development of the production technology of native fish species and the improving of the sustainability of aquaculture, as well as their practical implementation have contributed to making the aquaculture a successful sector of the Hungarian agricultural economy.

As a result of domestic research, Hungary takes the lead, even on a European scale, in common carp gene banking, genetic improvement of common carp breeds, organization of common carp breeding,

sperm cryopreservation, sustainable feed development, thermal water utilization for intensive production of high-value fishes (sturgeons, North African catfish), as well as the development and application of new pond aquaculture technologies. Such are the combined intensive-extensive fish production systems (e.g. „pond-in-pond” systems), but the results of the research into the development of intensive rearing technologies of our native fish species (e.g. pike, zander, wels, perch) are promising as well.

### **Main centres of fisheries and aquaculture research in Hungary**

Hungarian fisheries research is an organic part of the international R&D activities developing sustainable aquaculture. On an Eastern European scale, Hungarian fisheries and aquaculture research centres are regional leaders in terms of their active participation in the implementation of EU projects in the frame of many international research consortia. In addition to research into technological development, Hungarian researchers are actively involved in the development of Hungarian and European aquaculture strategies and programmes (e.g. European Strategic Research and Innovation Agenda), as well as in international programmes aiming at the eradication of hunger and poverty.

The role of the cooperation of research institutions and the industry in the implementation of fisheries development research programmes is increasing and needs to be further strengthened in the future. Research is mostly financed from Hungarian state funds and, to a lesser extent, from international funds, but the possibility of using alternative sources (funds of private companies, credits etc.) must be increasingly explored in the future.

Hungarian fisheries and aquaculture research is prepared to assist the sector in answering such new challenges as meeting the changing consumer demands, increasing need to utilize natural resources and use renewable energy, as well as climate change. The institutional background, infrastructure and human resources of fisheries and aquaculture research guarantee the provision of efficient assistance to the Hungarian fisheries and aquaculture sector.

## FISHERIES AND AQUACULTURE EDUCATION

The history of Hungarian fisheries and aquaculture education hardly exceeds 100 years. The previous conditions are well characterized by the request „to delegate suitable persons to be sent abroad in order to learn fisheries methods in practice” in order to meet the personnel demand of fisheries development. In 1906, the independent Unit of Fisheries Governance was formed within the line ministry to manage fisheries affairs. One of its first actions, in the same year, was the establishment of the Hungarian Royal Research Station for Fish Physiology and Wastewater Treatment, soon followed by a Fish Disease Research Station within the structure of the Budapest Veterinary College. These two institutions can be regarded as the pioneers of fisheries and aquaculture education, as their declared duties, in addition to practical work, also included performing of certain theoretical tasks (e.g. teaching). This state lasted until the end of WWII. The education structure that resulted in dozens of specialists participating in theoretical and practical education and extension programmes abroad was developed after WWII, answering the demand of Socialist economy. This period was characterized by three pillars representing different levels of education: vocational training, secondary training in fish breeding and higher fisheries education.

Qualified workers were trained by the Agricultural Vocational School in Tata (offering both full-time and correspondence training). Secondary training also took place in Tata, but it was less popular, as the training courses offering the qualification of technician were done by correspondence and the employment of middle-level cadres were not yet widespread in farms. Higher-level fisheries education was based on universities, which offered technical engineer and agricultural engineer courses.

Fisheries education was also transformed after the political changes of 1989. Secondary-level training virtually ceased to exist, and the popularity of vocational training (which, in its best years, trained 25-30 students annually) also decreased. Universities continued to provide fisheries courses, which was further

strengthened by the 1994 decision to move doctoral (PhD) trainings from the Hungarian Academy of Sciences (MTA) to universities. The EU accession resulted in new changes. Hungary, as an EU member, introduced the so-called Bologna educational system, whose first stage involved a generally 7-semester (3.5-year) course resulting in a bachelor degree (BSc, corresponding to the previous college-level diploma of technical engineer), followed by a further 4 semesters (2 years), upon which, students receive a master degree (MSc, corresponding to the previous university-level agricultural engineer diploma).

In spite of the many efforts made and in spite of the adoption of an accredited training curriculum, vocational education in fisheries and aquaculture has virtually disappeared. Fisheries training cannot be divided according to the traditional training structure today. The Sándor Jávorka Agricultural and Food Vocational School and Boarding House (Tata) could be the principal venue of vocational training, but the institution must comply with strict rules, and a training course can be launched only if a sufficient number of students apply. Unfortunately, this critical number could only rarely be recruited in the last years, and thus, the number of qualified specialists from Tata has decreased, although they are in great demand. The sector is characterized by the work of „semi-skilled fisheries workers”, who learn professional practices from older, Tata-trained colleagues.

All higher educational institutions offering agricultural education also offer courses in fisheries and fisheries management. A new higher educational scheme is the so-called „dual training”, where companies finance the student’s tuition (partly or fully), but expect him/her to do his/her thesis work in a pre-defined professional area. This solution has not yet become widespread in fisheries and aquaculture, the breakthrough is still some way off. Hungary also has a special type of training (which is poorly recognized by the EU and thus, the issued diploma has little value on the EU job market). This is the fisheries engineer training (currently called „postgraduate professional training in fisheries and fisheries management”). The specific feature of this course is that colleagues having at least a professional BSc degree can apply for the 2-year training, which is done in three one-week blocks per semester.



The transformed educational system brought about trainings and courses offered in the frame of the so-called National Training Register (OKJ), including a training in fisheries and aquaculture with a duration of 3 years in formal education and 800 to 1000 hours in non-formal education. The transformation and reforming of this training is in progress. Fisheries education includes the postgraduate and other training courses announced in relatively large numbers, several of which provide high-quality training despite the fact that they do not give any diploma or certificate.

A newly emerged direction in Hungarian educational policy with preference for training of foreign students mostly concerns universities and research institutes. Even before, there were numerous foreign students graduating in Hungary, but the so-called Stipendium Hungaricum scholarship system recently created by the Government has resulted in many students from abroad coming here for full-time or part-time BSc., MSc. and PhD courses. This is a laudable initiative as it creates a new opportunity for foreign students to improve their knowledge by learning from Hungarian theoretical and practical specialists (with a modern term, this is called knowledge transfer), and after returning home, they contribute to the good reputation of the Hungarian fisheries and aquaculture sector.

Higher educational institutions providing formal theoretical education also offer practical education and training, which is done in close cooperation with sectoral (Ministry of Agriculture) and academic (Hungarian Academy of Sciences) institutions. This duality is mostly beneficial for MSc- and PhD-level courses, allowing the students to obtain concrete practical skills in addition to theoretical knowledge.

Finally, it is important to stress that our education would be of little value without support from practical specialists from private companies and the companies themselves. The practical sphere has a store of knowledge and fisheries management information, which requires a cooperation as wide and deep as possible. We must dare to evaluate the needs and requirements of the practical sphere as this is the basis for practice-oriented training, and this is how the school system can produce qualified specialists that can cope with the challenges of the job market and can improve the reputation of our sector.

## PROFESSIONAL JOURNALS OF THE FISHERIES AND AQUACULTURE SECTOR

### Halászat

The establishment of the National Fisheries Inspectorate in 1899 gave new momentum to the development of pond aquaculture. The professional journal „Halászat”, first issued in 1899 under the editorship of János Landgráf, assisted this process with its own means. The journal was regularly published until 1945, the end of WWII, then it was suspended until 1954, with the exception of some issues published before 1948. A new series of the journal started in 1954 and was not interrupted until 1960. In 1961, fisheries articles were published in the journal „Kisállattenyésztés” („Small Animal Breeding”), but the regular issuing of the professional journal of Hungarian fisheries and aquaculture was relaunched in 1962. The periodicity of the issues changed several times, from 12 issues per year to 6 and later to 4, which frequency has been kept until now. The history of Hungarian professional periodicals was reviewed by János Gönczy in a series of Halászat articles. From 1985, Halászat was published by Agroinform Ltd. as a scientific journal of the agricultural line ministry. Since 2012, the publisher has been the Institute of Rural Development, Training and Extension (VKSZI) and its legal successor, the Herman Ottó Institute (HOI).

The journal is edited by specialists active in Hungarian fisheries advocacy, governance, research and education as well as innovation. As a result of support from the Ministry of Agriculture (FM), the journal has been entirely printed in colour since 2015. The year 2015 can be regarded as a milestone in the journal's history also because the electronic journal „Halászat – Tudomány” (Fisheries – Science) was launched that year on the site [www.agrarlapok.hu](http://www.agrarlapok.hu). „Halászat – Tudomány” only contains peer-reviewed scientific papers, which are thus recorded and referenced by the Hungarian Scientific Bibliography Database,

among others. In 2017, the preparations to the digitization of the printed issues of the „Halászat” journal published to the moment started with support from the Ministry of Agriculture.

The 110-plus-year-old journal „Halászat” assists the quality development of Hungarian fisheries with its own specific means, keeping its traditions but adapting to the changing demands. The journal has five permanent columns, as follows: (1) Event calendar; (2) Halászat’s portrait gallery; (3) International overview; (4) News of the Hungarias Ichthyological Society; (5) Science. In addition to the permanent columns, articles presenting the results, successes and problems of Hungarian fisheries and aquaculture and fisheries-related laws and decrees and helping in the interpretation of the latter are regularly published. The journal also provides a platform for professional discussions by raising issues of interest for the sector in keynote articles.

### Halászati Lapok

It was the age of the founding of professional journals when the first issue of Halászati Lapok appeared. In September 1999, the management of the National Association and Product Board of Fish Producers decided that Halászati Lapok, as an information and marketing newsletter, should provide information on advocacy and market regulation work on eight pages every month. The periodical, first published in February 2000, is now in its 19th year. The newsletter has been published the first week of every month for the last years. Regular information is needed as the most important competitive advantage in our days is if one – be it a private person or an entrepreneur – is a member of a community that has objectives and is willing to take action for their realization. There is solidarity in a good community, helping each other becomes natural, but it is of elementary interest to the members of such a community to be informed on each other’s activities. Informing the general public on the objectives and goals of the community is also an important aspect. Today’s Halászati Lapok is a successor and keeper of the fisheries tradition represented by the Halászati Lapok of almost two decades ago.

Turning over the pages of the bound volumes of the newsletter (which have been available online on the MA-HAL webpage – [www.magyarhal.hu](http://www.magyarhal.hu) – since 2000) – it is worth doing so as they contain lots of useful information – it can be seen that Halászati Lapok has reflected the life, struggles and results of the Hungarian fisheries community, but also their failures. Halászati Lapok is now a part of the lives of fishermen, fish producers, fisheries and aquaculture researchers, university lecturers, decision-makers and the staff of fisheries authorities, as the regularly appearing newsletter has become embedded into everyday processes. The mission of the newsletter remains the same: to voice the interests of the fisheries community in the future as well. Decision-makers and professionals of the fisheries administration are partners to this as they willingly speak to the newsletter. Halászati Lapok has reached a prestigious position among professional journals which we are keen to keep in the future as well.





# GOVERNANCE

Under the Governmental Decree 152/2014. (VI. 6.) concerning the tasks and competences of the members of the Government, the Government member responsible for fisheries is the Minister of Agriculture who, in the frame of this responsibility, prepares legislative acts on the protection of fish and other aquatic animals of economic importance, the rules of their preservation and exploitation, the conditions of fisheries management, fish inspection, angling and fishing, as well as the use of fisheries-related state revenues. In addition, the minister of the Ministry of Agriculture (hereinafter: FM) performs the tasks related to the transfer of State-owned fisheries rights of registered fisheries waters with contracts of lease or asset management contracts, he is responsible for the preservation and improvement of the genetic resources of aquaculture (organization of breeding work, state recognition of common carp breeds), as well as for fisheries market organization and the recognition of producer and inter-branch organizations in the field of fisheries.

In relation to grants from the European Fisheries Fund (2007-2013), FM performs the duties of Certifying Authority and Audit Authority. FM is also responsible for the transposition of community legislation implementing the EU Common Fisheries Policy into the Hungarian legal framework, ensuring of the application of directly applicable community acts in Hungary, as well as performing tasks generated by international obligations in the field of fisheries, sectoral tasks related to cooperation with international organizations, finalizing fisheries statistics and fulfilling the related data provision obligations (FAO, EU, OECD). FM ensures the representation of Hungary in professional organizations operating under the aegis of FAO. FM represents Hungary and develops the Hungarian position in the EU Internal and External Fisheries Policy Working Group, COREPER sessions, the Council of EU Fisheries Ministers, the meetings of EU Fisheries Directors and the Administrative Board of the European Fisheries Control Agency.

FM is responsible for the operation of the Secretariat of the National Fisheries Council (OHT), organizing the OHT meetings and preparing of its draft decisions. It is also the responsibility of FM to use the funds of the chapter-managed appropriation allocation „Support of fisheries management tasks of state importance”, amounting to about 500 million HUF per year, as well as developing the legal bases for recycling the funds into the fisheries sector, and provision of de minimis support to the participation in the Quality Carp Breeding Programme. FM, in the context of its fisheries-related administrative and record-keeping tasks, is responsible for the designation of special-purpose fisheries areas; registering electric fishing gear; issuing those permits for fish catching activities whose issuing lies within the minister's competence – i.e. country-wide fish catching permits for research purposes and other-purpose fish catching permits allowing fish catching with a direct-current electric fishing device in certain fisheries areas; announcing tenders for the leasing of state-owned fisheries rights and evaluation of the submitted applications.

FM keeps contact with its strategic partners: the Hungarian Aquaculture and Fisheries Inter-branch Organization, the National Federation of Hungarian Anglers and the Hungarian Ichthyological Society. FM is also responsible for determining the detailed professional content of the fishing inspector exam, the state fishing exam and the state angling exam. FM exercises the ownership rights and the professional control over the Balaton Fisheries Management Non-profit Company and the Balaton Fishing Company. The Ministry has a scientific journal called „Halászat”, which is unique among agricultural professional journals, as it has been in existence with brief interruptions since its founding in 1899, and is currently in its 110th year. The sectoral honours awarded by the Minister of Agriculture are the Pro Aquacultura Hungariae Award and the Medal of Merit „For Angling”. FM owns the „Quality Fish from Hungary” certification mark and takes part in the development and operation of the certification system. The Department of Angling and Fisheries Management has operated as an independent organizational unit within

the central managing body of fisheries governance (FM) since 2014 under the direction of the State Secretary for State-owned Lands.

The tasks and competences of the central and territorial fisheries authorities are defined by the Government Decree on the designation of bodies in charge of managing agricultural official and administrative tasks. As a general rule, the District Office in the seat of the county where the fisheries water is located or, in case of infringement of fisheries rules, where the domicile of the perpetrator is situated acts as the first-instance (territorial) fisheries authority. In practice, this is the body doing the fisheries-related administrative work (approval of fisheries management plans, receiving reports on fish kills, ordering fish rescue, tasks related to fisheries inspectors). This also includes the performing of tasks related to fish protection and fisheries management fines, as well as issuing documents entitling the holder to catch fish.

The Government Office of Pest County acts as a fishery authority of country-wide competence in permitting the stocking of non-indigenous species, fishes originating from outside the Pannonian biogeographical region, as well as fishes listed by the Council Regulation concerning use of alien and locally absent species in aquaculture, ordering the construction of fish ladders, obliging the fishing rights holder to act against vertebrate fish-eating animals and invasive fish species and it is also responsible for maintaining a list of fisheries experts. As a breeding authority, the Government Office of Pest County is also responsible for state approval of breeds, and performance testing for retaining the breed certification. In addition, the National Food Chain Safety Office (hereinafter: NÉBIH) also performs several administrative tasks of country-wide importance. These include the issuing of state angling tickets, state angling tickets for tourists and the accompanying catch logbooks, creating and operating a summary register of documents entitling the holder to catch fish, performing tasks related to the State Fish Inspection Service and operating the National Fisheries Database. In addition, NÉBIH also acts as the Member State's IUU authority as specified in the Council Regulation to prevent, deter and eliminate illegal, unreported and unregulated fishing.

The Research Institute for Agricultural Economy (hereinafter: AKI) plays an important role in the collection and processing of statistical data related to the fisheries sector. AKI is responsible, among others, for the preparation and evaluation of annual catch reports on the basis of the data provided by fish producers in the frame of the National Statistical Data Collection Programme, monitoring fish prices, provision of statistical data needed for informed decisions by FM, as well as preparation of economic studies and analyses related to the fisheries sector. In connection with the Hungarian Fisheries Operational Programme 2014-2020 (hereinafter: MAHOP), AKI does the evaluation of monitoring data on the programme and on the sector and performs the duties of National Correspondent in relation to the EU Data Collection Framework.

Since 2014, the tasks of the Managing Authority of the Hungarian Fisheries Operational Programme have been performed by the State Secretariat of Agriculture and Rural Development of the Prime Minister's Office. Therefore, the management of the finances of the European Maritime and Fisheries Fund, the performing of the tasks of the Secretariat of the MAHOP Managing Authority and other tasks related to MAHOP implementation are within the responsibility of the Prime Minister's Office.



## INTERNATIONAL RELATIONS

Hungarian carp breeding and fry rearing technologies are known all over the world in countries (from Viet Nam to Brazil) where carp rearing and pond aquaculture are important. The international fame and reputation of Hungarian carp culture and pond farming is mostly due to Professor Elek Woynárovich, who worked in many developing countries, from Nepal to Brazil, as an expert.

The results of Hungarian freshwater aquaculture attracted the attention of FAO, which, in addition to employing Hungarian experts, assisted the development of HAKI into an international research centre and the establishment of the Warmwater Fish Farm (TEHAG) in Százhalombatta in the 1970s. Due to HAKI and TEHAG, Hungarian aquaculture became even better known in the world. In the 1980s, Hungary was regarded by the international professional community as a major power in freshwater aquaculture. FAO relations remained important, in the frame of which, Mr. Imre Csávás served as a senior aquaculture officer of the FAO Regional Centre for Asia-Pacific for 13 years, and there were also many Hungarian experts working on aquaculture development programmes in many developing countries of the world. In addition, hundreds of specialists from developing countries studied in Hungary in the frame of FAO training courses. In addition to training and expert work, Hungary also assisted aquaculture development with investments, and supplying of equipment and fish seed, among others, in Brazil, Egypt and Iraq, with the active involvement of the Agroinvest company.

In 2014, FAO also assisted the establishment of the Network of Aquaculture Centres in Central and Eastern Europe (NACEE) in Szarvas, Hungary, which is still an active organization of European aquaculture. Through NACEE, Hungary bridges the gap between EU and non-EU countries in the field of aquaculture.

Hungarian research institutions (mainly HAKI) maintained active working relations with EU institutions and organizations even before Hungary joined the European Union, and later this cooperation grew even stronger. In addition to participation in EU R&D projects, Hungarian specialists have played an active role in various European organizations (e.g. EATiP, ACFA, AAC, SCARFISH), and the cooperation of landlocked countries in the field of freshwater fisheries was also organized at the initiative of Hungary. The president of the European Aquaculture Society (EAS) between 2006 and 2008 was Mr. László Váradi, a Hungarian fisheries specialist. The international cooperation of Hungary is not only active in the fields of research and governance. The Hungarian Aquaculture and Fisheries Inter-branch Organization (MA-HAL) and its two legal predecessors have been among the most active Eastern European members of the Federation of European Aquaculture Producers (FEAP). The Hungarian advocacy organization also played a significant role in the Fisheries Committee of the International Co-operative Alliance. Besides the Japanese president, one of the vice-presidents has always been the Hungarian representative: after Mr. Ferenc Bencze, it was Dr. Antal Csoma, then Gábor Csoma. The international recognition of Hungarian fisheries is also shown by the fact that the Committee has always invited Hungarian specialists as speakers at the Fisheries Development Seminars funded by the Government of Japan and held in many countries of the world. MA-HAL is currently a consortium member in two EU projects: the FP7 project „Diversify” and the H2020 project „ClimeFish”.

Fisheries is also an important component in programmes implemented with Hungarian participation, which aim at assisting developing countries and eradicating poverty and hunger. For instance, a tilapia hatchery operates in Laos and Hungarian experts assist fisheries development there in the frame of a tied aid loan project developing food supply in Laos. Hungarian fisheries and aquaculture institutions, organizations and producers are in bilateral cooperation with several European and non-European countries (including China), and the expansion of the relations with Algeria, Iran, Mexico and Tunisia is in progress.

International cooperation on a mutually beneficial basis has been one of the characteristics and strengths of Hungarian fisheries for decades. It is important to maintain and develop this special value through the cooperation of the sector's players and using targeted state funding.



Network of Aquaculture Centers in Central-Eastern Europe

## EU-SUPPORTED SECTORAL DEVELOPMENT PROGRAMMES: FIG, HOP AND MAHOP

### Financial Instrument for Fisheries Guidance (FIG), 2000-2006

The development and supporting of Hungarian fisheries and aquaculture assisted the implementation of a long-term strategy even before the EU accession. With the accession in 2004, Hungary became part of the 2000-2006 funding programme called the Financial Instrument for Fisheries Guidance (FIG). This form of support functioned as an independent structural fund under the Agriculture and Rural Development Operational Programme (ARDOP). Of the national subsidies, fisheries management and fish seed subsidies were allowed, which could be disbursed until the end of 2006. The separation of investment and marketing support forms could be observed. From the very beginning, the support funds served the provision and increase of the domestically produced commodity supply through expanding the production infrastructure and modernizing the existing facilities. This mostly applies to pond farms, intensive systems and fish processing plants. FIG, under the title „Structural aid to the fisheries sector“, became a separate measure of ARDOP within the priority „Creating the bases of competitive raw material production in agriculture“.

A determining factor of the continuation of the strategy was that the National Fisheries Strategic Plan defining the use of the resources of the European Fisheries Fund (EFF) in the new programming period, as well as the Fisheries Operational Programme (HOP) were already being outlined in 2007. A total of 86 project applications were submitted for the use of FIG funds in the 2004-2009 period, whereof 51 were successful. The most popular sub-measure was „Aquaculture. Construction and reconstruction of pond farms and industrial fish production facilities, and modernization of fish hatcheries“: 66 percent of the



received applications were submitted to this sub-measure. In general, it can be said that the measure was successful, Hungary virtually fully used the community aid allocated for fisheries and aquaculture support. A major success of the programme was that the applicants got acquainted with the new co-financing system, most of them became capable to apply for support, and thus, they could successfully participate in the new, 2007-2013 programming period.

### **Fisheries Operational Programme (HOP), 2007-2013**

For the whole programming period of 2007-2013, a much higher co-financed budget was available to the fisheries and aquaculture sector from EFF in the frame of the fully independent HOP than in the previous programme. The basic principles of fisheries development and support did not change in that period, either, they were practically the same as the principles of the Common Fisheries Policy (CFP), albeit taking into account the geographical position of Hungary, as a landlocked country, and the dominance of pond fish production.

The Fisheries Operational Programme opened significant development opportunities for the fisheries and aquaculture sector. These opportunities, in about 70 percent of the available resources, were eligible for construction, reconstruction and infrastructure development of pond farms, intensive systems and fish processing plants. About 25 percent of the funding supported collective measures of the fisheries sector and fish product promotion, while the remaining approximately 5 percent was the so-called technical assistance allocation assisting the administrative implementation of the programme. After programme amendments, the disbursed aid actually used for investment amounted to 87 percent of the total disbursed aid of nearly 14 billion HUF. Of the 686 aid applications submitted during the programme, 504 received support. The most frequent reason for refusal was the failure to meet the eligibility criteria. The Agricultural Rural Development Programme (AKG), whose funds were disbursed to fish farms on an area basis, was regarded by the sector as the most inclusive and efficient sectoral support programme to date.

In general, the programme can be said to have been successful, Hungary used its fisheries development allocation almost entirely. The minimal loss of funding was caused by the division into convergence and non-convergence regions, and the corresponding breakdown of funding allocations. The problem was that the number of applicants from non-convergence regions was insufficient to use the whole budget, but the EU rules did not allow the reallocation of the remaining funds to the less developed convergence regions. It could be seen that the applicants (who had also applied in the previous programme) were much more experienced in dealing with the support system. The phenomenon of so-called „project spiral” was observed on multiple occasions, i.e. some of the applicants applied more than once, developing their enterprises with the help of the grants following an individual company strategy.

The Fisheries Operational Programme of Hungary for the 2014-2020 period, organically continuing the previous programmes, includes their measures aiming at the increasing of fish consumption. It can be hoped that it will speed up the growth of fish and we can move some positions forward on the European fish consumption ranking.

### **Fisheries Operational Programme of Hungary, MAHOP (2014-2020)**

The Fisheries Operational Programme of Hungary (hereinafter: MAHOP) was approved by the European Commission on 7 December 2015. As a result, the actual implementation started only in 2016. In addition to further development of the productive base created by the Fisheries Operational Programme (HOP 2007-2013) and the fisheries SMEs, improving the competitiveness of traditional pond fish production and preserving or increasing the biodiversity, a priority objective of MAHOP is to improve the sustainability of aquaculture by using alternative energy sources and decreasing environmental load. Other important objectives are to assist the introduction of new species into fish production, developing intensive fish production applying innovative technologies and supporting fish processing. In order to increase fish consumption, the MAHOP Managing Authority continues the marketing campaign „Kaj

rá!” („Get hooked!”) for the promotion of fish consumption, which was started in the previous programming period.

The measures of MAHOP, as well as the corresponding calls have been developed according to these priorities. The specific objectives defined by MAHOP are also in agreement with EU priorities. The implementation of the measures will improve the production security, the competitiveness of the sector, the working conditions and the stability of SMEs. By 31 March 2017, all the calls of MAHOP (8 standard and 5 special ones) were announced for the entire funding amount, i.e. about 16.072 billion HUF.





## DEVELOPMENT DIRECTIONS AND VISION OF HUNGARIAN AQUACULTURE

The objectives and development priorities of Hungarian aquaculture development are included in the National Aquaculture Strategic Plan 2014-2020. During its preparation, the compilers took into account both the existing Hungarian documents and the documents defining the vision of European aquaculture. The evaluation of the sector included in the Strategy shows that aquaculture development is not only a possibility for Hungary, but also a need, whose importance exceeds the economic weight of the sector. The increasing of Hungarian fish consumption, which is among the last in the European ranking, and eliminating its seasonality are strategic objectives from both economic and public health points of view.

In order to be competitive, the aquaculture sector needs to search new ways, innovate, increase the diversity of production technologies and produced species. One of the important ways to do this (and one that has reached obvious successes by now) is the development of multifunctional aquaculture, which – in addition to ensuring economic stability for the fish producer – can also improve the public image of the sector. The natural assets of Hungary, e.g. geothermal resources, should be better exploited and the use of recirculating aquaculture systems (RAS), which intensively produce high-value species, should be expanded. Another promising direction is the development of combined systems, which are called this way for combining the positive characteristics of both intensive and extensive systems. Hungary has reached significant results in the development of such systems, which are also a way to ensure the sustainable intensification of fish production. Increasing the processing capacities and improving the exploiting of existing capacities are needed in order to increase consumption. International experience also shows that a significant increase of fish consumption cannot be reached without broadening the product range through the development of highly processed,

kitchen-ready, attractively and hygienically packaged fish products. In addition to a well-planned marketing, making known the health effects, ways of preparation and market availability of fish dishes and organizing traditional events (e.g. fish festivals), no less important is to reach younger generations (e.g. through better presence in the social media). Increasing the share of fish dishes in public catering is very important from the point of view of improving their acceptance from childhood. The role of angling cannot be neglected, either, as it connects many people with fish and fish dishes through personal experience. In the field of marketing, it is important to improve the visibility of aquaculture, to make known its economic, societal and social role, to debunk existing myths (through publications, events and the development of a sectoral information system).

It cannot be sufficiently stressed that consumer trust should also be improved in order to increase fish consumption, which requires a targeted quality policy. Certification systems (such as the „Quality Fish from Hungary” certification mark, whose development is currently in progress) can play an important role in ensuring reliable quality, while geographical indications (PDO, PGI) can help in highlighting quality local products. The market organization and advocacy activities of MA-HAL can play a key role in this process.

It is a task of special importance to create a favourable legal and economic environment for investors, which would ensure sufficient returns on their investments into aquaculture. This requires close cooperation with the other ministries, MA-HAL, the National Chamber of Agriculture (NAK) and the European Commission in order to be able to avoid the adoption of legislation negatively affecting the competitiveness and sustainability of Hungarian aquaculture. Legislation must be based on reliable statistics and research results, which requires targeted data collection and research programmes, without which, it is difficult for the governance to justify its position in case of a controversy. The Data Collection Framework (DCF) launched in the frame of the Fisheries Operational Programme of Hungary and managed by the Research Institute for Agricultural Economics (AKI) should be an important step forward in this area. The same reason of informed decision-making makes it indispensable to introduce a registration obligation for fish production facilities. In addition, in accordance



with both European and Hungarian governance objectives, it is an urgent task to simplify administrative procedures for aquaculture enterprises in order to reduce their administrative (and financial) burden.

In order to further strengthen the professional links and advocacy potential of the Hungarian fisheries and aquaculture governance, it is important to further improve the regional cooperation with both Central and Eastern European countries and EU member states with interest in freshwater aquaculture. During the determination of post-2020 funding priorities, common action and representation of Hungarian interests through common regional interests are necessary already at the planning stage.

The stopping of commercial fishing in natural waters indirectly also strengthens the role of aquaculture. The decision was strongly criticized, although, in fact, it has only consequently implemented the UN Sustainable Development Goal 14.4. requiring member states to effectively regulate harvesting and end overfishing and illegal, unreported and unregulated (IUU) fishing. In the future, the market is to be supplied with domestic fish by aquaculture, producing controlled and stable-quality fish products. Good-quality aquaculture fish will play a primary role in the fish supply of the upcoming years, while the demand for natural-water fish may stimulate species diversification in aquaculture, and thus, technology development. Because of nature conservation reasons, the production of alien fish species should be more strictly controlled, in some areas it may even need to be banned in order to avoid escapes into natural waters.

Hungary, and Hungarian fisheries institutions and specialists have actively participated in international aquaculture programmes aiming to eradicate hunger and poverty since the 1980s. The internationally recognized values of Hungarian fisheries and aquaculture need to be preserved and further strengthened. We hope that the coordinated and consequent realization of these objectives in close cooperation between the governance, the research, the education and the sectoral advocacy may start a significant development in the sector.





## CLOSING REMARKS

This jubilee publication reviews the last six decades' development of the Hungarian fisheries advocacy organization and the Hungarian fisheries and aquaculture sector. After six decades of development, we can say that the Hungarian fisheries development sector faces a promising future. With the establishment of the Hungarian Aquaculture and Fisheries Inter-branch Organization (MA-HAL), the sector can advocate its interests more effectively, better assisting the farmers. The Hungarian fisheries sector has always been capable of renewing itself. After the 1989 political changes, this was the only animal production sector whose profitability did not drop.

With the accession to the European Union, fish producers got access to new development resources, as subsidies from the Government of Hungary and the EU allowed farmers to give adequate answers to new socioeconomic challenges. In addition to pond aquaculture, new technologies and systems are at the service of fish production (intensive technologies, recirculating aquaculture systems, combined intensive-extensive systems, etc.) and new fish species have been introduced into production. The fisheries sector has supplied Hungarian consumers with healthy and good-quality products, and an increasing volume of Hungarian-produced fish is also sold for export. MA-HAL – in agreement with the Government's objectives – does its best to increase the currently very low level of domestic fish consumption, as fish is one of the most important protein sources in our diet. The sectoral efforts are also strengthened and their realization is assisted by the European Union's increased focus on the development of freshwater aquaculture (including that of Hungary) compared to the previous years.

Of course, there is no stopping. Of the tasks for the future, it is worth mentioning the ones that attract special attention of the sectoral management. The vocational training, the organization of the training of a new generation of farmers, the spreading of intensive technologies, the increasing of the level of

processing are all important. After the conclusion of a strategic cooperation agreement with MOHOSZ, it has become important for the fisheries sector also to meet the anglers' demand at a high level. The diversification of natural-water fish stocks means to us that, besides common carp, predatory fish species and breams also need to be supplied in much larger volumes for the restocking of natural waters.

To conclude, hereby I would like to invite all readers to consume much more fish as it will not only be beneficial for Hungarian fish farmers, but also for the consumers' health.

Dr. Németh István  
MA-HAL president

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